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Isolated Right Ventricular Myocardial Infarction due to Occlusion of Acute Marginal Artery: An Easily Missed Diagnosis

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ABSTRACT

Isolated right ventricular myocardial infarction is a rare entity in the spectrum of acute coronary syndrome. It is often overlooked during the assessment of patients suspected to have acute coronary syndrome.A 49 years old male presented with atypical chest discomfort associated with vagal symptoms. The initial ECGs were not supporting. The Echocardiography revealed an isolated right ventricular myocardial wall motion abonrmality that was initially missed. Coronary angiogram revealed a dominant right circulation and a selective occlusion of an acute marginal branch. Successful angioplasty was done .Cardiac MRI performed 48 hours later confirmed isolated character of the infarction by showing hyperenhancement of free wall of right ventricle.In the current report, we illustrates the importance of looking carefully for isolated right ventricular infarction during echocardiography in all cases of suspected myocardial ischemia.

Abbreviations

ECG: Electrocardiogram;
LV: Le Ventricle;
MI: Myocardial Infarction;
RCA: Right Coronary Artery;
RV: Right Ventricle;
IRVMI: Isolated Right Ventricular Myocardial Infarction;
PCI: primary percutaneous intervention

Introduction

Isolated right ventricular myocardial infarction is rarely seen and accounts for less than 3% of all myocardial infarctions (1). It may be caused by acute thrombtic occlusion of either acute marginal branch or non-dominant right coronary artery (2), it is usually overlooked during the assessment of patients suspected to have acute coronary syndrome. This present report highlight the importance of a careful assessment of right ventricular wall motion and function of patients with suspected acute coronary syndrome especially when clinical symptoms and ECG are inconclusive.

Case report

A 49 years old male, non-smoker, with 5-years-history of hypertension and hyperlipidemia has sufferd of fatigue, dizziness and chest discomfort about 8 hours prior to presentation. The first standard ECG with both the 12 standard leads and right sided-precordial leads showed no ST modification and no Q waves (Figure 1). He was hemodynamically stable but hypotensive, His blood pressure was 95 /70 mmHg, and his heart rate was 65 beats/min. There were no additional sounds or pericardial rub. The first troponin was barely positive. An echocardiogram at the emergency room was done which was reported to be normal. Patient was conservatively managed for acute coronary syndrome .He was given aspirin 300 mg, ticagrelor 180 mg, atorvastatin 80 mg.

At his admission in intensive care unit, bed–side echocardiography was repeated to eliminate diagnosis that can mimic right ventricle infarction .It revealed normal left ventricle function with no regional wall motion abnormality, decreased right ventricle function (tricuspid annular peak systolic excursion was 15 mm. Fractional area change was 30%), moderate hypokinesia of free wall and apex was relatively spared (figure 2). Diagnosis of isolated right ventricular myocardial infarction (RVMI) was considered. Meanwhile, He presented a sustained monomorphic ventricular tachycardia with left bundle brunch morphology (figure 3) that was managed with amiodarone. Then, he was directly transferred to cath lab for an urgent primary percutaneous intervention (PCI).

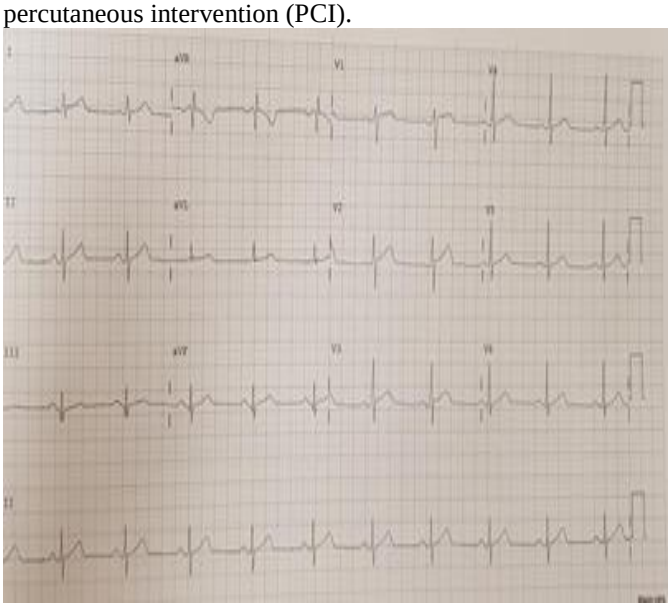

Figure 1.A Standard 12-lead ECG at time of presentation is normal.

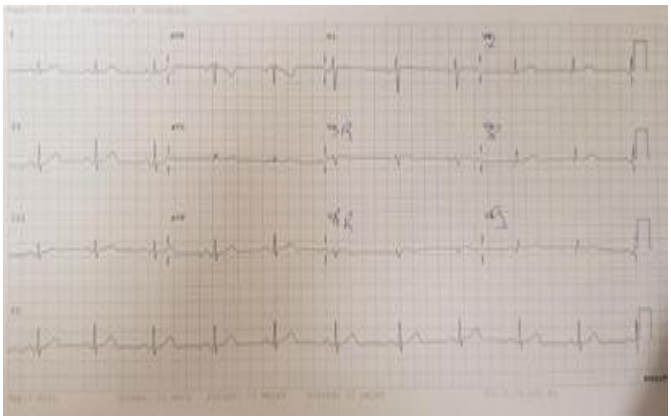

Figure 1.B Right-sided ECG leads showing no ST elevation and no Q waves.

Coronary angiogram revealed non obstructive atherosclerotic plaque in the left coronary artery, right dominant circulation with thrombotic ostial occlusion of acute marginal artery (RCA) for which a drug eluting stent was deployed with a good angiographic result (figure3). Contrast-enhanced magnetic resonance imaging 24 hours after presentation showed delayed hyperenhancement of the right ventricular (RV) free wall (arrowheads) and sparing of the left ventricle (LV) and the right ventricular apex (figure 4 A,B) which is consistent of isolated right ventricle infarction, moderate dysfunction of systolic function and RV ejection fraction is 44 % .Our patient did not have typical hemodynamic abnomarlities of IRVI and was discharge 72 h later in good condition.

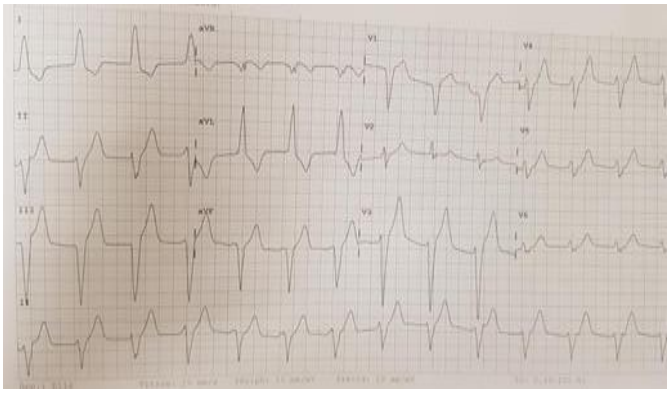

Figure 2. Monomorphic ventricular tachycardia with right ventricle origin morphology.

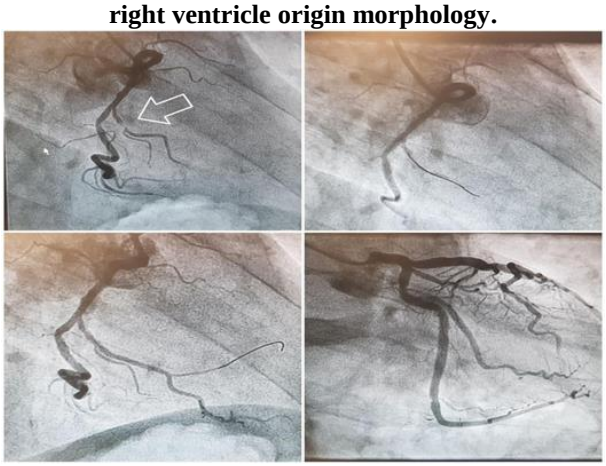

Figure 3. Coronary angiography:
On the right,Cranial view of right coronary artery showing occluded right ventricular branch (white arrow); on the left ,Restoration of TIMI 3 flow in acute marginal branch after balloon angioplasty and stent.

Figure 4. A. Four chamber single shot SSFP IR shows transmural late gadolinium enhancement of the right ventricular free wall.

Figure 4.B. short axis single shot SSFP IR shows transmural LGE of the right ventricular free wall.

Discussion

Mostly RVMI occurs in association with inferior wall MI [1].Isolated right ventricular infarction is a rare entity in the spectrum of acute coronary syndrome. It constitutes less than 3%of all cases of myocardial infarction .It results from atherothrombotic disease of acute marginal artery or non-dominant right ventricle artery. However, most incidences of IRVI in the literature have reported as complications to percutaneous intervention in the RCA [2].

The most sensitive electrocardiographic finding in a right ventricular infarction is ST segment elevation in lead V4R.However, it is important to remember that electrocardiographic changes can be transient and not all patients with right ventricular infarction will have ST elevations on right sided precordial leads [3]. Thus, transthoracic echocardiography help to establish the diagnosis of acute RV infarction. It shows valuable features such as RV free wall hypokinesia, dilated RV chamber, leftward septal.

Cardiac magnetic resonance provides more accurate assessment of RV size, ejection fraction and regional wall motion abnormalities. Late gadolinium enhancement appears to be more sensitive in detecting RV involvement compared to echocardiography [4].

In patients with inferior myocardial infarction, the presence of RV infarction is associated with a higher risk of arrhythmias and cardiogenic shock and death. Interestingly, IRVI appears to have a relatively good long term prognosis, although immediate complications resulting in sudden death have been reported. Even without revascularization, RV function tends to recover over the months following the acute

event. This benign clinical course is most likely due to the thin muscular wall of this ventricle which provides a more favorable supply/demand ratio and the ample collateral supply from LV territory [5].

As showed in this case report, The Management of right ventricle infarction should include strict hemodynamic monitoring, avoidance of vasodilators and diuretics, and treatment of arrhythmias and inotropic drugs if it is needed (6).

Conclusion

Isolated RVMI is unfrequent in our daily routine, however, it should be kept as a possibility while echocardiographically evaluating a suspected case of acute coronary syndrome.

Consent

A written informed consent was obtained from patient for the publication of this paper

Conflict of interest

The authors declare that they have no competing interest

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